

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A heat transfer system which comprises:
 - a hollow supply tube having a proximal end and a distal end;
 - a capillary tube having a proximal end and a distal end with the proximal end thereof connected in fluid communication with the distal end of said supply tube, said capillary tube being formed with a lumen having a length "l" and a diameter "d";
 - a tip member positioned to surround the distal end of said capillary tube to create a cryo-chamber therebetween; and

a source of refrigerant fluid connected in fluid communication with the proximal end of the supply tube to introduce the refrigerant fluid into the supply tube wherein said fluid refrigerant has been pre-cooled to approximately -45°C at a working pressure “ p_w ” of approximately 400 psia for transfer of the refrigerant fluid through said supply tube and through said capillary tube for exit from the distal end of said capillary tube and into said cryo-chamber in a substantially liquid state for transition of the refrigerant fluid into a gaseous state with a tip pressure “ p_t ” and a tip temperature $[["t_t"]]$ “ T_t ” for heat transfer through said tip member and into the gaseous fluid refrigerant in said cryo-chamber.

2. (Currently Amended) A system as recited in claim 1 wherein said supply tube is formed with a lumen having a length “ l_s ” and a diameter “ d_s ”, and wherein the diameter of the lumen of said capillary tube “ d ” is less than the diameter “ d_s ” and “ l_s ” is [[less]] greater than or equal to the length “ l ”.

3. (Original) A system as recited in claim 1 wherein an aspect ratio “ d/l ” for the capillary tube is in a range of 0.0008 to 0.0017.

4. (Original) A system as recited in claim 3 wherein the length “ l ” of said capillary tube is in a range between approximately four and one half inches and approximately ten inches.

5. (Original) A system as recited in claim 4 wherein the diameter "d" of said capillary tube is 0.008 inches.

6. (Original) A system as recited in claim 1 wherein the refrigerant fluid is nitrous oxide (N₂O).

7. (Cancelled)

8. (Currently Amended) A system as recited in claim [[7]] 1 wherein the tip pressure "p_t" is less than one atmosphere.

9. (Currently Amended) A system as recited in claim 8 wherein the tip temperature [[“p_t”]] T_t is less than minus eighty four degrees Centigrade ($p_t < -84^{\circ}\text{C}$) (T_t < -84^{\circ}\text{C}).

10. (Currently Amended) A heat transfer system which comprises:
- a means for providing a liquid fluid refrigerant at a first pressure;
- a means for cooling the fluid refrigerant to approximately -45°C at a first pressure of approximately 400 psia to transform said fluid refrigerant into a liquid state;
- a means for reducing the pressure on the liquid refrigerant from the first pressure to a second pressure; and
- a means for introducing the liquid refrigerant into a cryo-chamber at the second pressure for transition of the liquid refrigerant into a gaseous state in the cryo-chamber to cause heat to transfer from outside the cryo-chamber and into the cryo-chamber.

11. (Original) A system as recited in claim 10 wherein said reducing means comprises:
- a hollow supply tube having a proximal end and a distal end; and
- a capillary tube having a proximal end and a distal end with the proximal end thereof connected in fluid communication with the distal end of said supply tube, said capillary tube being formed with a lumen having a length "l" and a diameter "d" wherein an aspect ratio "d/l" for the capillary tube is in a range of 0.0008 to 0.0017.

12. (Original) A system as recited in claim 11 wherein the length "l" of said capillary tube is in a range between approximately four and one half inches and approximately ten inches and the diameter "d" of said capillary tube is in a range between approximately 0.008 inches and approximately 0.010 inches.

13. (Currently Amended) A system as recited in claim 10 wherein ~~the first pressure is a working pressure "p_w" in a range between three hundred and fifty psia and five hundred psia and the second pressure is a tip pressure "p_t" less than one atmosphere.~~

14. (Currently Amended) A system as recited in claim 13 wherein the refrigerant in the gaseous state in the cryo-chamber has a tip temperature $\{[t]\}$ T_t less than minus eighty four degrees Centigrade ($p_t < 84^\circ\text{C}$) ($T_t < -84^\circ\text{C}$).

15. (Original) A system as recited in claim 10 wherein the liquid refrigerant is nitrous oxide (N₂O).

16. (Currently Amended) A method for transferring heat which comprises the steps of:

providing a liquid fluid refrigerant at a first pressure;
cooling said fluid refrigerant to approximately -45°C at a first pressure of approximately 400 psia to transform said fluid refrigerant into a liquid state;
reducing the pressure on the liquid refrigerant from the first pressure to a second pressure; and
introducing the liquid refrigerant into a cryo-chamber at the second pressure for transition of the liquid refrigerant into a gaseous state in the cryo-chamber to cause a transfer of heat outside the cryo-chamber and into the cryo-chamber.

17. (Original) A method as recited in claim 16 wherein said reducing step comprises the steps of:

advancing the liquid refrigerant through a hollow supply tube to a capillary tube having a proximal end and a distal end; and
causing the liquid refrigerant to flow through the lumen of the capillary tube wherein the lumen of the capillary tube has a length "l" and a diameter "d" with an aspect ratio "d/l" for the capillary tube in a range of 0.0008 to 0.0017.

18. (Original) A method as recited in claim 17 wherein the length "l" of said capillary tube is in a range between approximately four and one half inches and approximately ten inches and the diameter "d" of said capillary tube is in a range between approximately 0.008 inches and approximately 0.010 inches.

19. (Currently Amended) A method as recited in claim 16 wherein the first pressure is a working pressure " p_w " in a range between three hundred and fifty psia and five hundred psia and the second pressure is a tip pressure " p_t " less than one atmosphere.

20. (Currently Amended) A method as recited in claim 16 wherein the liquid refrigerant is nitrous oxide (N_2O) and when in the gaseous state in the cryo-chamber has a tip temperature $[["t_t"]]$ " T_t " less than minus eighty four degrees Centigrade ($p_t < -84^{\circ}C$) ($T_t < -84^{\circ}C$).